The Future of Agricultural Biotechnology: Prospects for Brazil

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Important Advances: Agricultural Biotechnology R & D in Brazil

- Marker-assisted plant and animal breeding;
- Genomic mapping of several species;
- Embryo transfer applied to different animal species;
- Genetic resources characterization and conservation;
- Transgenic products **(Sampaio, 2000).**

Genomic research in agriculture:

- Outstanding national research institutes;
- International scientific recognition;
- Sugar Cane Est Project (ONSA – FAPESP);
- Corn to produce growth hormone (UNICAMP-USP);
- Papaya resistant to Brazilian Strain of Ring Spot Virus (EMBRAPA-Cornell University).
- Common Beans Resistant to Gold Mosaic Virus (EMBRAPA –Rice and Beans Center).

First time in the world: sequencing of a phytopathogenic bacterium

- *Xylella Fastidiosa* – sequenced by Brazilian research group - FAPESP (São Paulo State Research Foundation, in collaboration with US ARS (Agricultural Research Service).
- Pierce's disease, major U.S. grape problem.
- Costs: millions of dollars annually to Brazilian citrus growers (Simpson et al. *Nature, 406 (13): 151-157).*

New Research developments

- New plants with better stress resistance;
- Lower inputs of toxic chemicals;
- Plants turned into bio-factories;
- Plants that can be better harvested, transforming sunlight and more resistant to UV radiation (diminishing ozone layer) **(Sampaio, 2000)**;
- Reduction of allergenic components in conventional food **(Avery, 2000)**.

However...

- Despite these extraordinary advances in biotechnology, genetically modified plants have not yet been commercialized in the country.
- In 1998, CTNBio, the National Technical Biosafety Commission approved, after detailed analysis, Monsanto's Round Up Ready soybean and requested 5 years post-commercialization monitoring plan.

The Biosafety Regulatory System

- 1995 – Biosafety Law. Presidential Decree created CTNBio (National Technical Biosafety Commission), with 36 members, with authority:
- to deal with scientific aspects of biosafety of GMOs related to human and animal health, agriculture and the environment.
- to regulate laboratory and field experiments.
- to provide final technical opinion on safety of GM plants and food derived from GM crops, previous to commercial clearance approval by Ministries.

CTNBio - National Technical Biosafety Commission

- 36 members (18 members and 18 substitutes):
- 16 indicated by the scientific community associations in biotechnology and biosafety);
- 14 indicated by the Ministries (S & T, Agriculture, Health, Environment, Education and Foreign Relations);
- 2 indicated by consumers'organizations;
- 2 indicated by biotechnology enterprises associations;
- 2 indicated by occupational health organizations;

Legal issue: authority to identify GMO's environmental risks

- When CTNBio approved commercialization of Monsanto's transgenic soybean, tolerant to the herbicide glyphosate, it did not identify this plant as "potentially harmful for the environment".
- Therefore, CTNBio did not request from the Ministry of Environment a "Study of Environmental Impact" – EIA.

Former legal framework: unclear

- It was not so explicit in the former legal framework CTNBio's authority to identify when a GMO can be potentially harmful to human health and the environment.
- This situation resulted in several injunctions and lawsuits by NGOs opposed to plant biotechnology.

New legislation: positive legal scenario for CTNBio

- Provisional Law – December 2000, drastically changed the legal framework.
- Modified the biosafety scenario and clearly established CTNBio's authority to identify when a GMO can be potentially harmful to human health and the environment.
- Established CTNBio's decision as a previous and necessary condition to Ministry of Environment request EIA – Environmental Impact Study.

Persistence of adverse political situation

- Despite the new positive legal framework, the commercial approval of glyphosate tolerant soybean in Brazil is still pending.
- The next phase of the legal dispute is expected soon, in the last week of February.
- Congress will examine a legal project by federal deputy Confúcio Moura.
- Justice will give the veredict on Monsanto's soybean.

Pending legal issues

- Labelling is one of the pending legal issues.
- Presidential decree established label for products containing more than 4% of GMOs, but Congress is now discussing, in deputy Confucio Moura's project, who included the same legal criteria, the possibility of a more strict legislation.
- The feasibility of labelling criteria will be carefully examined by the government.

The future

- The expansion and commercialization of transgenic crops worldwide seem an irreversible process.
- The global transgenic crop area expanded by more than 25-fold : from 1.7 million hectares in 1996 to 44.2 million hectares in 2000, now 16% of total crop area.
- Transgenic soybean is now planted in 36% of soybean area **(Clive James, 2001).**

The global market

- Four countries (US, Argentina, Canada and China) grew 99% of global transgenic area.
- Brazil is the third global crop protection market (8%) for herbicides, insecticides, fungicides and plant growth regulators and others, estimated in US$ 2.5 billion **(Wood Mackenzie Agr.Serv. In Clive James 2000)**
- Brazil is the sixth world commercial market for seed and planting material, estimated in US$ 1.2 billion **(FIS, 2001).**

I. Prospects for Brazil

- Lack of regulation of certified GM seeds and introduction of illegal transgenic seeds in the South of Brazil, from Argentina (ABRASEM, Brazilian Association of Seed Producers), may affect competitiveness and productivity.
- This situation suggests growing acceptance of GM seeds by farmers, despite the environmentalist dream of a sacred transgenic-free soil, which has kept biotechnology enterprises out of the largest agricultural Latin-American market for almost four years.

II.Prospects for Brazil

- Environmental biosafety concerns are of course a crucial and sensitive issue if we take into account the biodiversity of Brazil.
- But the final government decisions will require the necessary scientific evidence and biosafety procedures requested by CTNBio.
- In the international scene, these concerns should not be used as market constraints for GMOs exports from developing countries like Brazil. Ethics, IPR and equity are crucial issues.

III. Prospects for Brazil

- Economic analysts and agriculture policy makers: despite the current legal impasse, legalization of transgenic crops is just a matter of time.
- Even pessimistic prospects considering current political obstacles tend to project legalization of GMO crops to 2003.

Final comments

- In CTNBio, we understand agriculture in Brazil should benefit from all contributions from plant breeding technologies.
- A combined sustainable strategy should be adopted with both conventional and biotechnology methods.
- In our view, safe improved crop varieties are crucial to mankind's future and to future security in both developed and developing countries.